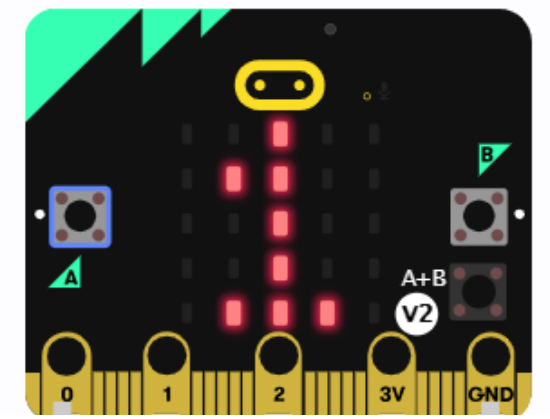
MOONHACK 2024

Talking Rubbish



Create a device to track the types of rubbish placed in your bin and use the data to develop an action plan.

INTRODUCTION



What you will need

HARDWARE

micro:bit and power source - the more the better!

A computer with internet access

SOFTWARE

MakeCode Editor

What you will learn

- How to **play sound**
- How to **input** data using blocks
- How to **export data** to a graph

Additional notes for educators

Check out our blog post that talks about the science behind the project, integration links for teachers, and where to find more information.

Moonhack Certificate

Finished the project? Download a certificate of completion here.

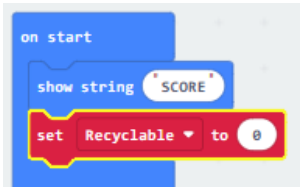
STEP 1 - STARTING THE PROGRAM

Open MakeCode Editor. Click the block to create a new project. Call the project 'Talking Rubbish'. Let's create a program where anyone placing rubbish in the bin can track if they are placing recyclables or trash in the bin.

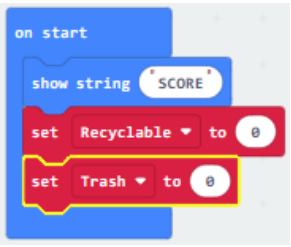
Start your first algorithm with the event on start. From the basic menu select the show string block and type score. This will show on the screen when there is a hard start of the micro:bit



Create a new variable called Recyclable. Add a set variable block. Select recyclable and set the variable to 0.



Create a second new variable called trash. Add a set trash to 0 block. This will mean the count starts at 0 for data tracking of both recyclables and trash.



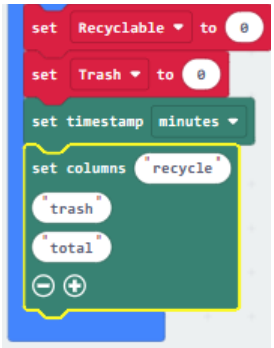
The next blocks come from the extension menu. Click the Extensions box and select Data Logger. This will add a new set of blocks to your screen.

From the data logger menu, add a set timestamp block. Select minutes. This will log data every minute, which we will use at the end.



From the data logger menu, add a set columns block. This will control how the data is presented to us when we retrieve it.

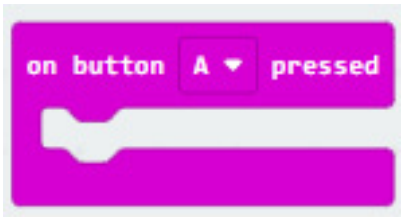
Name the first column recycle. Click the plus symbol and add a second column called trash. Click the plus symbol and add a third column called total.



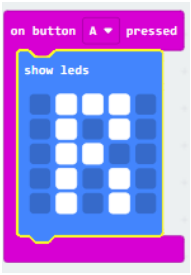
STEP 2 - TRACKING RECYCLABLES IN THE BIN

When someone places an item in the bin, they will either click block A to say it is a recyclable or click block B to say it is rubbish. If a recyclable item goes in the bin we want to give them negative feedback - recyclables should go in the recycling bin.

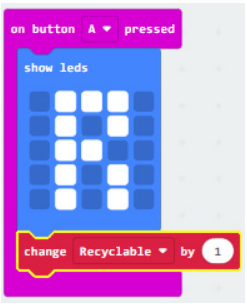
Start your second algorithm with the the input of button A pressed. Button A will be used to track recyclables placed in the bin.



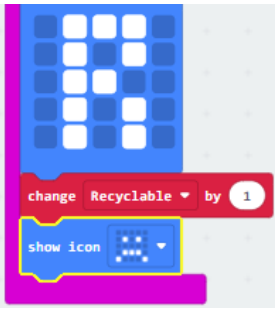
Add in a basic block that shows the letter R using the LED lights.



Add in a change 'recyclable' by 1 block from the variables menu.



Add in a basic block that shows the sad face icon. A recyclable item should go in the recycling, not the rubbish bin.



Add in a melody block sounds sad. Then add a show number block and drop in the recyclable variable. This will show the total recyclables in the bin.



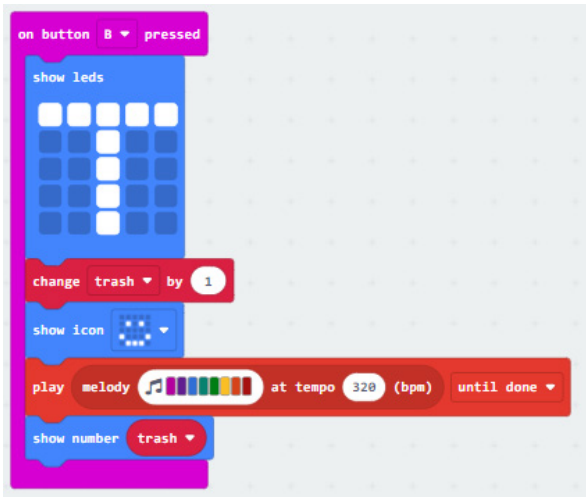


Test your code. Press button A to see the light displays and hear your tune.

STEP 3 - TRACKING RUBBISH ITEMS IN THE BIN

This code is similar to the previous one. This time it uses block B and tracks rubbish in the bin. You can right click the previous algorithm and duplicate, or recreate the blocks.

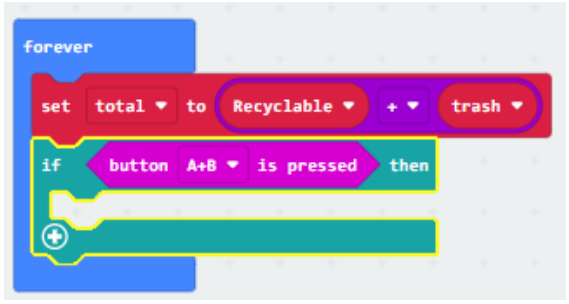
Start your third algorithm with the input of block B pressed. Block B will be used to track rubbish (trash) placed in the bin. Make the LED show the letter T and change the trash variable by 1. Add a smiley face icon and swap the melody to something happy. Change the variable to trash for show number.



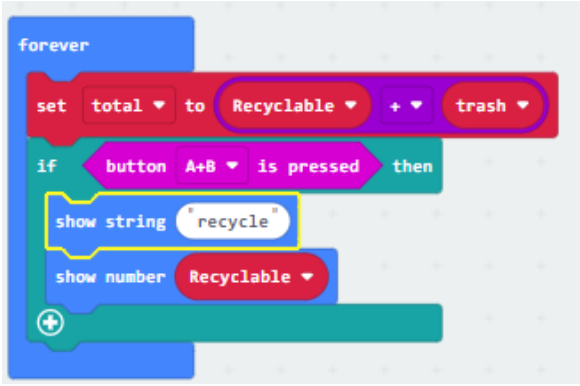
Test your code. Press button B to see the lights display and hear your tune.

STEP 4 - SHOWING THE DATA

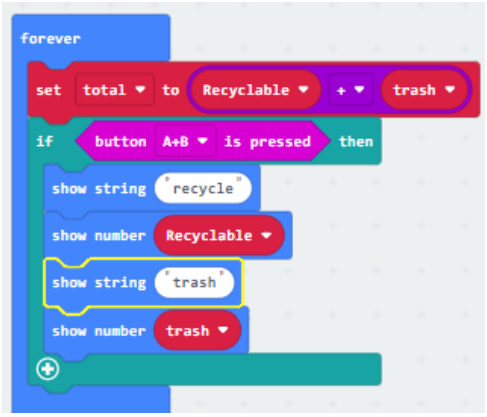
Start a new algorithm with forever. From the variables menu create a new variable called total. Add a set total block. Inside it add a math input of +. On one side add the recyclable variable and on the other side add the variable trash. Then add an if then loop. Add the input button A+B pressed.



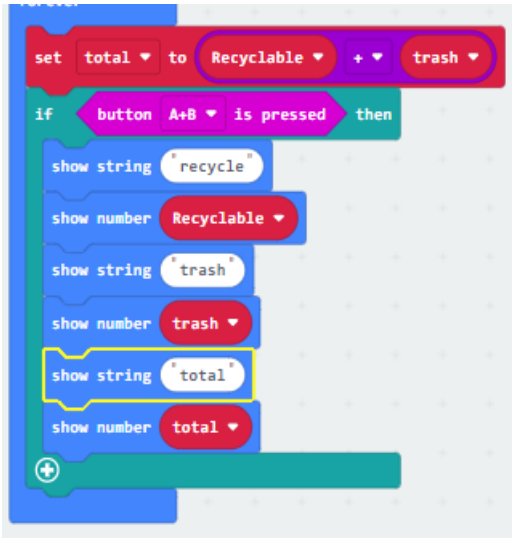
Add a basic block to show string 'recycle' and add a basic block to show number with the variable recyclable. When button A+B are pressed the LED lights will read the word recycle and then the total of recyclable items in the bin.



Duplicate the last two blocks, or add two new blocks. Show the string 'trash' and show the number of the variable trash.



Duplicate the same two blocks again, or add two new blocks. Show the string 'total' and show the number of the variable total. This number is the variables of recyclable and trash added together, to give a total number of rubbish items in the bin.





Test your code. Add some trash and recycle items to your 'bin'. When you are ready, press A and B together and see the results.

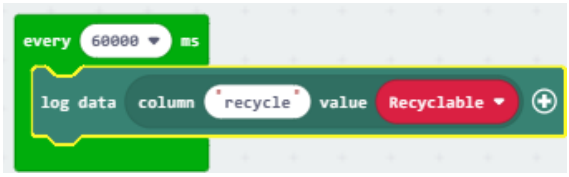
STEP 5 - LOGGING THE DATA

The final step is to program the micro:bit to log the data so that it can be exported for us to use.

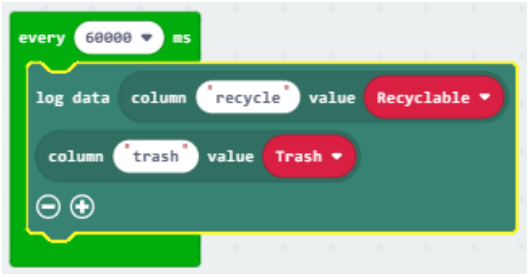
Start a new algorithm. From the loops many choose the every ms block. Set the time to 1 minute. This means every minute it will record the data.



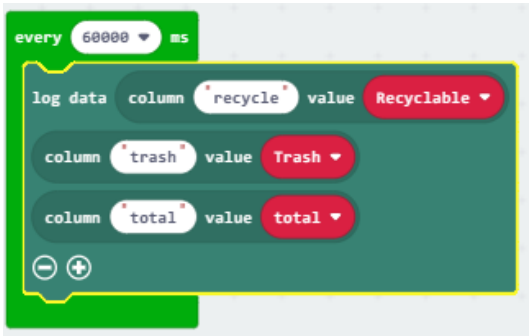
From the data logger menu add a log data block. Beside column, type in recycle. In the value add the variable recyclable.



Click the plus to add another column. Call this one trash and add in the trash variable.



Click the plus again and add a final column that represents the total.



Your program is now ready to run! Download your program to your micro:bit, connect to a power source and now you are ready to collect your data. When your data collection is done, follow the steps below to retrieve your data.

Connect your micro:bit to your computer. Open the micro:bit and double click on My Data.



Now you can see your data, download it to use it in Excel or Google Sheets, or click on visual preview to engage with your data online.

time (minutes)	recycle	trash	total
0.08838333333333333	0	0	0
1.0884666666666667	1	7	8
2.0884833333333335	5	13	18
3.08875	6	18	24
4.088816666666666	6	25	31

Challenges:

Sharing your data

How can you create some data sharing to help others understand how they can have a positive impact on climate change, through correct disposal of their rubbish? Infographics, posters, graphs, videos - what can you come up with?

Using data for impact

The reason for logging this data is to come up with an action plan to create better ways to dispose of our rubbish. Our landfill is full of items that can be recycled or repurposed. Come up with a way to use your data to create a call to action for others.

Wider impact

In what ways can we take this project and create it on a bigger scale? This might be great for one bin in a library, classroom, or home. How can you recreate this project on a larger scale to encourage others to dispose of their rubbish correctly, or even better, to make more informed decisions to create less rubbish?

Design Task

How do people know what button to press? How will this be placed near a bin so that people can use it? Come up with a housing for the Micro:Bit and a labeling system for the buttons.

Congratulations! You're a Moonhack changemaker. You can try one of our other projects or try one of the challenges above.

Don't forget to talk to an adult about registering your participation and downloading your certificate at moonhack.com

